Jurnal Obsesi
Volume 9 Issue 1 (2025) Pages 1-9
Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini
ISSN: 2549-8959 (Online) 2356-1327 (Print)

The Effectiveness of Financial Literacy Education on Children's Economic Decision-Making: A Meta-Analysis Approach

ST. Hatidja [1]✉, Suhardi[2], Abdul Rasyid[3], Rizal Ula Ananta Fauzi[4], Nurul Hudaeni[5], Ria Oktora[6], Afrizal[7], Tomi Apra Santosa[8], Unpris Yastanti[9]
Sekolah Tinggi Ekonomi AMKOP Makassar, Indoensia[(1)]; Universitas Pertiba, Indonesia[(2,6,7)] Universitas Islam Negeri Syarif Hidayatullah Jakarta, Indonesia[(3)]; Universitas PGRI Madiun, Indonesia[(4)]; Universitas Teknologi Muhammadiyah Jakarta, Indonesia[(5)]; Akademi Teknik Adikarya, Indonesia[(8)]; Universitas Bina Sarana Informatika, Indonesia[(9)]
DOI: 10.31004/obsesi.v9i1.6738

Abstract
This study aims to determine the influence of financial literacy education on children's economic decision-making. This type of research is quantitative research with a meta-analysis approach. The inclusion criteria in this study are 1) data from national and international journals indexed by SINTA and Scopus, 2) research published in 2021-2024, 3) research must be relevant, 4) research data must report complete data to calculate the effect size value. Research data was obtained from 25 studies that have met the inclusion criteria—data analysis with the help of the JASP 0.8.5 application. The study's results concluded that the average effect size value was (d = 0.994; z = 11.198; p< 0.001) in the high effect size category. These findings show that financial literacy education significantly influences children's decision-making.

Keywords: *Literacy Education; Effect Size; Financial; Decision; Meta-analysis*

✉ Corresponding author: St.Hatidja
Email Address: hatidja@gmail.com (Makassar, Indonesia)
Received 10 November 2024, Accepted 2 February 2025, Published 2 February 2025

Introduction
Financial literacy is an essential skill needed to face the challenges of modern life. The ability to understand and manage finances, such as budgeting, saving, and investing money, not only helps individuals achieve financial stability but also protects them from unexpected economic risks. In everyday life, financial literacy affects a person's ability to make wise decisions regarding spending, savings, and investments, which ultimately impacts the quality of life(Mccormick, 2009;Lusardi, 2019). Without adequate understanding, individuals tend to be trapped in debt or fail to take advantage of existing economic opportunities, so financial literacy is an important foundation for building personal and family well-being (Lingyan et al., 2023).

Financial literacy is becoming increasingly important in the midst of the complexity of the global economy (Yildirim et al., 2024; Shroff et al., 2024). The era of globalization, which is marked by wide access to financial technology and global markets, opens up opportunities as well as challenges for the younger generation to manage their finances intelligently (Frączek & Klimontowicz, 2015). With good financial literacy, the younger generation can plan for their

DOI: 10.31004/obsesi.v9i1.6738

financial future, avoid the pitfalls of overconsumption, and make informed investment decisions. On the other hand, a lack of financial literacy can make them vulnerable to financial risks, such as consumptive debt or investment fraud (Boozer & Simon, 2024; Mustika et al., 2024). Therefore, financial literacy not only helps the younger generation to survive in a competitive economy, but also provides the ability to thrive and take advantage of opportunities in the midst of global economic dynamics (Ersoy, 2023).

Financial literacy is still a major challenge in various population groups, including Children's, low-income communities, and those living in remote areas. Many individuals in this group do not have a basic understanding of financial concepts such as debt management, the importance of savings, or investments(Kusumawati et al., 2023). Low financial literacy is often caused by a lack of access to formal financial education and a lack of relevant information. As a result, many Children's are unable to make informed financial decisions, thus increasing the risk of personal and household economic instability. The financial literacy gap is also seen among Children's, who are a strategic group in shaping the future of a country's economy (Björklund et al., 2022). Many learners are not taught about money management or financial planning in school, so they tend to be less prepared for real-world economic challenges. Low financial understanding can make it easy for Children's to get caught up in consumptive behaviors, such as excessive use of credit cards or loans without planning. This can have an impact on their ability to achieve financial stability after entering the workforce (Mizzi, 2021; Böhm et al., 2021).

Low financial literacy affects ssiwa's ability to make rational and strategic economic decisions (Dat., 2020). When a person does not understand the basic concepts of finance, they tend to make decisions based on intuition or wrong information. This can lead to them missing out on economic opportunities, being stuck in uncontrolled debt, or failing to achieve long-term financial goals (Baihaqqy et al., 2020). This gap demonstrates the need for greater efforts to improve financial literacy across all population groups, including Children's, through formal education, community training, and multi-stakeholder financial literacy campaigns.

Economic education plays a key role in building Children's' financial literacy from an early age. Through structured learning, Children's can understand basic concepts such as money management, financial planning, and wise investing (Bueno & Dela Cruz, 2024). By equipping Children's with this knowledge, economic education helps them to recognize the importance of managing financial resources effectively. (Mccormick, 2009; Pang, 2010) Financial literacy taught in school is not only a provision for personal needs, but also trains Children's to think critically in dealing with more complex economic problems in the future(Yaniawati et al., 2022). Effective economic education has major implications for Children's' financial decision-making. Children's who understand how to manage money and evaluate financial risks are more likely to make rational decisions, such as saving for urgent needs or choosing investments that fit their risk profile (Kamarudeen & Vijayalakshmi, 2023). In addition, economics education also teaches Children's to avoid financial pitfalls, such as uncontrolled debt or high-risk investments without adequate understanding. Thus, economic education helps create a generation that is not only financially literate, but also able to adapt to global economic challenges (Bueno & Dela Cruz, 2024).

By building financial literacy through economic education, schools and educational institutions play a role in creating a financially independent society. Children's who understand the importance of financial planning and management are not only able to achieve their personal goals, but also contribute to economic stability at the community and national levels (Mandell & Klein, 2009). Financial literacy taught from an early age also influences the mindset of the younger generation towards money, instilling the values of thrift, productive investment, and entrepreneurship. Thus, economic education serves as an important foundation in building a financially intelligent society and ready to face modern economic dynamics.

DOI: 10.31004/obsesi.v9i1.6738

Recent research in the field of financial literacy shows that economic education has a positive impact on improving Children's' ability to make better financial decisions. Several studies have proven that structured educational interventions, such as simulation-based teaching or integrating financial literacy in the curriculum, can help Children's develop a better understanding of financial planning and risk management. However, the quality and outcomes of these programs vary widely, depending on the teaching method, the duration of the program, and the local context (Lingyan et al., 2023; Goyal & Choudhary, 2024). Several recent studies also indicate the importance of a technology-based approach in financial literacy education, where educational applications and digital platforms play an important role in supporting more interactive and engaging learning (Shroff et al., 2024).

Although the importance of financial literacy is widely recognized, there is a lack of research that comprehensively summarizes the effectiveness of financial literacy education in improving economic decision-making abilities among Children's(Frączek & Klimontowicz, 2015; Lusardi, 2019; Yildirim et al., 2024; Retno Mustika et al., 2024). Many existing studies focus on local or specific contexts without comparing findings from different countries or regions. Existing research tends to be case studies or only assess short-term impacts, while broader analyses with meta-analysis methods that integrate data from various studies around the world are still very limited (Björklund et al., 2022). Therefore, there is a need to fill this gap by conducting a meta-analysis that examines the effectiveness of financial literacy education as a whole, looking at the factors that affect the education program's success, as well as the difference in its impact on different groups of Children.

This study offers a new approach to evaluating the effectiveness of financial literacy education by using a meta-analysis method that integrates data from various existing studies. In this way, the study not only assesses the impact of financial literacy education as a whole, but also identifies the variables that contribute to its effectiveness, such as teaching methods, educational duration, and student demographic factors. The study will also expand the scope by combining research from different countries and regions, allowing cross-cultural comparisons and providing new insights into the elements of education that are most effective in improving children's economic decision-making.

Methodology

This study uses a meta-analysis approach to determine the effect size of the influence of financial literacy education on Children's' economic decision-making. Meta-analysis is a research approach that evaluates previous research statistically to reach a conclusion (Tamur et al., 2020; Badawi et al., 2023; Nurtamam et al., 2023; Zulyusri et al., 2023). The meta-analysis research procedure is 1) determining the research inclusion criteria, 2) collecting data and coding, 3) analyzing the data statistically.

Eligibility Criteria

In the process of searching for data through Google Scholar, ScienceDirect, Wiley, ERIC, ProQuest, Fronteins and Web of Science databases, the research must meet several inclusion criteria, namely 1) data from national and international journals indexed by SINTA and Scopus, 2) research published in 2021-2024, 3) research must be relevant, 4) research data must report complete data to calculate the effect size value From the data search, 25 studies were obtained that met the inclusion criteria published in 2021-2024 which can be seen in Table 2.

Statistical Analysis

Data analysis in this study calculates the effect size value of each study analyzed. The effect size value in this study is to calculate the effect of the influence of financial literacy education on Children's' economic decision-making. According to (Borenstein et al., 2007) The stages of data analysis in the meta-analysis can be seen in (Figure 1.). Furthermore, the criteria for the effect size value in the study can be seen in Table 1.

DOI: 10.31004/obsesi.v9i1.6738

Table 1. Category Effect Size Value

Effect Size	Category
0.0≤ES≤ 0.2	Low
0.2≤ES≤ 0.8	Medium
ES≥ 0.8	High

Sumber: (Borenstein et al., 2007; Bachtiar et al., 2023; Tamur et al., 2020)
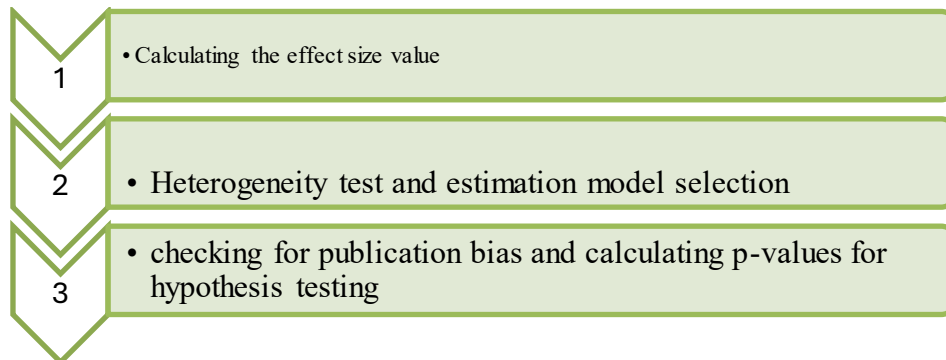
Figure 1. Data Analysis Procedure

Result and Discussion

Based on the results of the data search through the database, 25 studies/articles met the inclusion criteria. The effect size and error standard can be seen in Table 2.

Table 2. Effect Size and Standard Error Every Research

Code Jurnal	Years	Effect Size	Standard Error
JU 1	2023	2.21	0.54
JU 2	2023	1.04	0.30
JU 3	2021	0.66	0.18
JU 4	2021	0.91	0.36
JU 5	2021	1.16	0.42
JU 6	2024	1.52	0.33
JU 7	2022	0.82	0.30
JU 8	2022	0.42	0.17
JU 9	2022	0.37	0.20
JU 10	2024	1.92	0.46
JU 11	2024	1.06	0.42
JU 12	2024	1.19	0.38
JU 13	2024	1.15	0.45
JU 14	2024	0.72	0.29
JU 15	2021	0.88	0.25
JU 16	2021	0.53	0.22
JU 17	2022	0.97	0.36
JU 18	2024	1.29	0.44
JU 19	2023	1.82	0.40
JU 20	2024	1.44	0.37
JU 21	2021	1.49	0.33
JU 22	2021	1.34	0.41
JU 23	2022	0.83	0.31
JU 24	2024	0.79	0.27
JU 25	2023	0.95	0.30

DOI: 10.31004/obsesi.v9i1.6738

Based on Table 2, the effect size value of the 24 studies ranged from 0.37 to 2.21. According to Borenstein et al., (2007) Of the 25 effect sizes, 6 studies had medium criteria effect sizes, and 19 studies had high criteria effect size values. Furthermore, 25 studies were analyzed to determine an estimation model to calculate the mean effect size. The analysis of the fixed and random effect model estimation models can be seen in Table 3.

Table 3. Fixed and Random effect

	Q	df	p
Omnibus test of Coefficients Model	62.872	1	< 0.001
Test of Residual Heterogeneity	152.056	24	< 0.001

Based on Table 3, a Q value of 152,056 was obtained higher than the value of 6 2,872 with a coefficient interval of 95% and a p value of 0.001 <. The findings can be concluded that the value of 25 effect sizes analyzed is heterogeneously distributed. Therefore, the model used to calculate the mean effect size is a random effect model. Furthermore, checking publication bias through funnel plot analysis and Rosenthal fail safe N (FSN) test (Tamur et al., 2020; Badawi et al., 2022; Ichsan et al., 2023b; Borenstein et al., 2007); (Asnur et al., 2024). The results of checking publication bias with funnel plot can be seen in Figure 2.
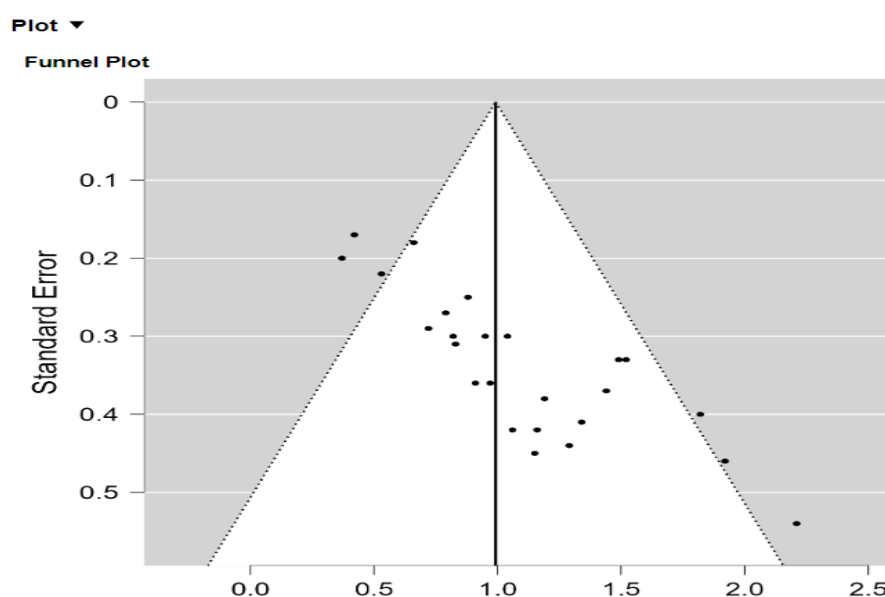
Figure 2. Funnel Plot

Based on Figure 2, the funnel plot analysis is not yet known whether it is symmetrical or asymmetrical, so it is necessary to conduct a Rosenthal Fail-Safe N (FSN) test. The results of the Rosenthal Fail-Safe N calculation can be seen in Table 4.

Table 4. Fail-Safe N

File Drawer Analysis			
	Fail Safe N	Target Significance	Observed Significance
Rosenthal	2317	0.050	< 0.001

Based on Table 4, the Fail Safe N value of 2504 is greater than the value of 5k + 10 = 5(24) + 10 = 130, so it can be concluded that the analysis of 25 effect sizes in this data is not biased by publication and can be scientifically accounted for. Next, the p-value is calculated to

DOI: 10.31004/obsesi.v9i1.6738

test the hypothesis through the random effect model. The results of the summary effect model analysis with the random effect model can be seen in Table 5.

Table 5. Mean Effect Size

Coefficient						
	Effect Size	Standard Error	z	p	Coeficient Interval 95%	
					Lower	Upper
Intercept	0.994	0.103	11.19	< 0.01	0.818	1.67

Table 5. The mean effect size value is 0.994 with a standard error of 0.103 and a 95% confidence level of 0.818 lower and 1.67 upper. These findings explain that financial literacy education has a significant influence on student decision-making with a score (z= 11.19; p < 0.001) with a high effect size category. Financial literacy education plays a very important role in preparing Children's for the increasingly complex economic challenges of the modern world. However, many studies have focused on local or small-scale contexts, which makes it difficult to understand how effective financial literacy education programs are overall. Meta-analysis studies have great potential in summarizing the results of various existing studies, thus providing a more comprehensive and valid picture of the effectiveness of these programs. By combining data from different studies, meta-analyses can identify general trends, factors influencing outcomes, as well as variations in effectiveness based on various conditions (Mandell & Klein, 2009). Financial literacy helps Children's develop the essential skills necessary to make wise economic decisions, such as budget planning, debt management, and safe investments. Previous research has shown that financial literacy education programs can improve Children's' ability to understand the consequences of long-term financial decisions, such as credit and savings management (Boozer & Simon, n.d. ; (Bueno & Dela Cruz, 2024). However, the biggest challenge is ensuring that the teaching of financial literacy is not only theoretical but also practical, so that Children's can actually use it in their daily lives. This meta-analysis study aims to identify the extent to which these programs have succeeded in improving financial decision-making abilities among Children's (Hubbard et al., 2016).

The results of this meta-analysis are expected to reveal differences in effectiveness between different types of financial literacy education programs. Several studies have shown that technology-based approaches, such as the use of educational applications and digital simulations, can improve student engagement and teaching effectiveness (Kamarudeen & Vijayalakshmi, 2023). On the other hand, traditional methods such as classroom teaching also show positive results, but with significant differences in terms of program duration, material quality, and evaluation methods. Therefore, it is important to analyze these factors thoroughly in this meta-analysis, in order to understand the key elements that influence the success of financial literacy education (Williams et al., 2022). Demographic and contextual factors can affect the effectiveness of financial literacy programs. For example, factors such as a student's age, socio-economic background, and education level can play an important role in determining how well they can apply the skills learned (Pang, 2010; Frączek & Klimontowicz, 2015). Several studies have shown that Children's from lower economic backgrounds may need a more specific approach to understanding and managing their finances well. By understanding these differences, this research can provide deeper insights into how to tailor educational programs to be more inclusive and effective for all groups of Children's (Lusardi, 2019).

Although many financial literacy education programs have great potential, the challenges in their implementation often hinder optimal results. Some of the obstacles that are often faced include lack of resources, lack of training for teachers, and lack of integration with other related subjects(Mccormick, 2009; Majeed et al., 2022). Therefore, it is important to pay attention to these challenges in research, as well as provide practical recommendations to

address these barriers. Successful program implementation requires careful planning, support from authorities, and continuous evaluation in order to adapt learning methods to student needs. Furthermore, this research is expected to make an important contribution in understanding the extent to which financial literacy education can influence Children's' economic decision-making (Goyal & Choudhary, 2024).

Conclusion

From the results of this study, it can be concluded that the average effect size value is (d = 0.994; z = 11,198 ; p< 0.001) of the high effect size category. These findings show that financial literacy education significantly influences student decision-making. This meta-analysis shows that well-structured educational programs that involve interactive methods and practical applications are more effective in improving Children's' financial skills compared to traditional approaches. Factors such as the use of technology, experiential teaching, and curriculum adaptation to suit the demographic needs of Children's also affect the effectiveness of the program. As such, it is important for policymakers and educators to design and implement programs that are more integrated and tailored to the context of Children's so that the results are more optimal. This research provides important insights for the development of educational curriculum and teaching practices in schools. Greater efforts are needed to train teachers in delivering financial literacy materials effectively and provide adequate resources for program implementation. In addition, the study encourages education policymakers to consider the integration of financial literacy education in the curriculum as a comprehensive and sustainable one, both at the local and national levels. With coordinated efforts, it is expected that Children's can acquire skills that support intelligent economic decision-making, which in turn can improve their financial well-being in the future.

This research has several limitations that need to be considered. One of the main limitations is the limited number of samples used, so the results of the study may not be widely generalized. In addition, the study only focused on one specific context without considering other variables that might affect the results. For future research, it is recommended to expand the scope of the sample and explore additional relevant variables. The use of more diverse research methods, such as longitudinal or mixed methods, can also provide a deeper understanding of the phenomenon being studied.

Acknowledgments

The author is grateful to the researchers who have collaborated in completing this research.

References

Asnur, L., Jalinus, N., Faridah, A., Apra, T., Ambiyar, R. D., & Utami, F. (2024). *Video-blogs (Vlogs) -based Project : A Meta Analysis*. *14*(5), 1553–1557.

Badawi et al. (2023). Integration of Blended Learning and Project-Based Learning (BPjBL) on Achievement of Children's' learning goals: A Meta-analysis study. *Pegem Journal of Education and Instruction*, *13*(4). https://doi.org/10.47750/pegegog.13.04.32

Baihaqqy, M. R. I., Disman, Nugraha, & Sari, M. (2020). The correlation between education level and understanding of financial literacy and its effect on investment decisions in capital markets. *Journal of Education and E-Learning Research*, *7*(3), 306–313. https://doi.org/10.20448/JOURNAL.509.2020.73.306.313

Björklund, M., Tväråna, M., Jägerskog, A. S., & Strandberg, M. (2022). Grasping the concept of value: Exploring Children's' economic and financial literacy in citizenship education. *Journal of Social Science Education*, *21*(4). https://doi.org/10.11576/jsse-5535

Böhm, P., Böhmová, G., Šimková, V., & Gazdíková, J. (2021). the Impact of Secondary

Education on the Level of Financial Literacy: the Case of Slovakia. *Problems of Education in the 21st Century*, *79*(1), 13–33. https://doi.org/10.33225/pec/21.79.13

Boozer, B. B., & Simon, A. A. (n.d.). *Evaluating academic decisions and risk : A study of university business Children's*. *45*, 1–12.

Borenstein, M., Hedges, L., & Rothstein, H. (2007). *Introduction to Meta-Analysis*. www.Meta-Analysis.com

Bueno, D., & Dela Cruz, A. (2024). Advanced Financial Management Competencies of Graduate School Children's in Business Administration: A Case Study. *IMRaD Journal*, *6*, 26–34. https://doi.org/10.69502/jvgk9882

D.A.T, K. (2020). The Impact of Financial Literacy on Investment Decisions: With Special Reference to Undergraduates in Western Province, Sri Lanka. *Asian Journal of Contemporary Education*, *4*(2), 110–126. https://doi.org/10.18488/journal.137.2020.42.110.126

Edy Nurtamam, M., Apra Santosa, T., Aprilisia, S., Rahman, A., & Suharyat, Y. (2023). Meta-analysis: The Effectiveness of Iot-Based Flipped Learning to Improve Children's' Problem Solving Abilities. *Jurnal Edumaspul*, *7*(1), 2023–1492.

Ersoy, N. Sen. (2023). Empowering Inclusion: Addressing Barriers in Distance Learning for Disadvantaged Groups. *Turkish Online Journal of Educational Technology - TOJET*, *22*(4), 52–60.

Frączek, B., & Klimontowicz, M. (2015). Financial literacy and its influence on young customers' decision factors. *Journal of Innovation Management*, *3*(1), 62–84. https://doi.org/10.24840/2183-0606_003.001_0007

Goyal, A., & Choudhary, A. (2024). Role of Financial Literacy in Financial Planning and Decision Making Among College Children's. *Pacific Business Review International*, *17*(1), 56–70.

Hubbard, E., Matthews, P., & Samek, A. (2016). Using online compound interest tools to improve financial literacy. *Journal of Economic Education*, *47*(2), 106–120. https://doi.org/10.1080/00220485.2016.1146097

Ichsan, I., Suharyat, Y., Santosa, T. A., & Satria, E. (2023). Effectiveness of STEM-Based Learning in Teaching 21 st Century Skills in Generation Z Student in Science Learning: A Meta-Analysis. *Jurnal Penelitian Pendidikan IPA*, *9*(1), 150–166. https://doi.org/10.29303/jppipa.v9i1.2517

Kamarudeen, M., & Vijayalakshmi, K. (2023). Machine Learning based Financial Management Mobile Application to enhance College Children's' Financial Literacy. *Proceedings of International Conference on Research in Education and Science*, *9*(1), 1237–1253.

Kusumawati, I. B., Fachrudin, A. D., Indra Putri, R. I., & Zulkardi. (2023). Infusing Islamic financial literacy in mathematics education for Islamic school. *Journal on Mathematics Education*, *14*(1), 19–34. https://doi.org/10.22342/JME.V14I1.PP19-34

Lingyan, W., Mawenge, Rani, D. R., & Patil, S. (2023). RETRACTED ARTICLE: Study on relationship between personal financial planning and financial literacy to stimulate economic advancement. *Annals of Operations Research*, *326*(s1), 11. https://doi.org/10.1007/s10479-021-04278-8

Lusardi, A. (2019). Financial literacy and the need for financial education: evidence and implications. *Swiss Journal of Economics and Statistics*, *155*(1), 1–8. https://doi.org/10.1186/s41937-019-0027-5

DOI: 10.31004/obsesi.v9i1.6738

Majeed, K. B., Khan, A., Ghaffar, I., Asghar, H., & Ahmed, P. J. (2022). The linkage between financial literacy and financial decision-making with the mediating effect of investment behavior. *Palarch's Journal of Archaeology Of Egypt/Egyptology*, *19*(3), 1582–1598.

Mandell, L., & Klein, L. S. (2009). The impact of financial literacy education on subsequent financial behavior. *Journal of Financial Counseling and Planning*, *20*(1), 15–24.

Mccormick, M. H. (2009). The effectiveness of youth financial education: A review of the literature. *Journal of Financial Counseling and Planning*, *20*(1), 70–83.

Mizzi, E. (2021). Cultivating financial literacy through secondary school economics education: Access to powerful knowledge. *International Journal for Business Education*, *162*(1). https://doi.org/10.30707/ijbe162.1.1648090658.886513

Pang, M. F. (2010). Boosting financial literacy: Benefits from learning study. *Instructional Science*, *38*(6), 659–677. https://doi.org/10.1007/s11251-009-9094-9

Retno Mustika, D., Sri Umi Mintarti, W., Agung, H., & Hari, W. (2024). *Development of Learning Material in Behavioral Economics for Higher Education*. *14*(3), 192–199. https://doi.org/10.47750/pegegog.14.03.18

Shroff, S. J., Paliwal, U. L., & Dewasiri, N. J. (2024). Unraveling the impact of financial literacy on investment decisions in an emerging market. *Business Strategy and Development*, *7*(1), 97–105. https://doi.org/10.1002/bsd2.337

Tamur, M., Juandi, D., & Kusumah, Y. S. (2020). The effectiveness of the application of mathematical software in indonesia; a meta-analysis study. *International Journal of Instruction*, *13*(4), 867–884. https://doi.org/10.29333/iji.2020.13453a

Williams, P., Morton, J. K., & Christian, B. J. (2022). Enhancing financial literacy in children 5–12 years old using authentic learning within a school market garden programme. *Education 3-13*, *50*(3), 361–374. https://doi.org/10.1080/03004279.2020.1851741

Yaniawati, P., Maat, S. M., Supianti, I. I., & Fisher, D. (2022). European Journal of Educational Research. *European Journal of Educational Research*, *11*(1), 69–81. https://pdf.eu-jer.com/EU-JER_9_1_395.pdf

Yildirim, S., Yildirim, M. M., & Vardari, L. (2024). The Effect of Undergraduate Programs on Financial Literacy Level: The Case Of Kosovo. *Pegem Egitim Ve Ogretim Dergisi*, *14*(3), 170–182. https://doi.org/10.47750/pegegog.14.03.16

Youna Chatrine Bachtiar, Mohammad Edy Nurtamam, Tomi Apra Santosa, Unan Yasmaniar Oktiawati, & Abdul Rahman. (2023). the Effect of Problem Based Learning Model Based on React Approach on Children's' 21St Century Skills: Meta-Analysis. *International Journal of Educational Review, Law And Social Sciences (IJERLAS)*, *3*(5), 1576–1589. https://doi.org/10.54443/ijerlas.v3i5.1047

Zulyusri, Z., Santosa, T. A., Festiyed, F., Yerimadesi, Y., Yohandri, Y., Razak, A., & Sofianora, A. (2023). Effectiveness of STEM Learning Based on Design Thinking in Improving Critical Thinking Skills in Science Learning: A Meta-Analysis. *Jurnal Penelitian Pendidikan IPA*, *9*(6), 112–119. https://doi.org/10.29303/jppipa.v9i6.3709